

What are the interlocks for steam turbine?

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3 Answers



Bhola Shanker, Its all about Power..
Answered Dec 8, 2015



By Interlocks, we are ensuring the safety of Steam turbine and its accessories.

Steam turbine and generator together have hell a lot of interlocks for the safety and reliability of the units. I'll try to cover the major one,

All these interlocks are usually based on the supervisory probes/sensors provided by OEM to make sure the turbine parameters should not jump the safe limits. And if they act, they either trip the machine or shutdown it.

1. Bearing Vibration - Probes are provided on almost every bearings for measuring bearing vibration (sensor type- displacement/velocity/or Acceleration) and they trip the machine in case high vibration crosses specific limits.
2. Bearing temperature. - High temp. Alarm and then Trip.
3. Differential Expansion (It indicates the relative expansion of Turbine casing and Turbine rotor - Will have trip limits on both +Ve and -Ve side) and Absolute Expansion (Measures the expansion of casing relative to Bearing pedestal).
4. Lube Oil temperature - Alarm - Not trip usually.
5. Lube Oil Pressure- Low pressure trip.
6. Steam parameters - Low steam flow and temperature- Trip.
7. Vacuum deterioration- High Exhaust Pressure-Low Vacuum - Trip.
8. High Hotwell level - Trip.
9. Overspeed - Trip (Usually 3 or 6 sensors - Voting logic - 2 out of 3/ 4 out of 6).
10. High Exhaust temperature - Trip.

11. If Both CEPs (Condensate Extraction pump) are unavailable - Trip.
12. If Both Vacuum pumps are unavailable - Trip.
13. If upstream Steam source (Boiler or HRSG) Trips - ST Trip.
14. Control/Hydraulic oil pressure (Operating the Main steam stop and control valves) Low-Trip.

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Gautam Ghosh, former Senior Manager of DPL, WB GOVT. Undertaking
Updated Aug 22



For safe operation of turbine and auxiliaries certain permissive, interlock & protection schemes are provided in the protection circuit. A few are mentioned below:-

1. Turbine protection circuit, can not be “reset” until and unless condenser vacuum is made normal, overspeed governor latch is in normal mode, similarly the lever associated with high axial shift of turbine is in normal position. Such schemes are provided in Siemens machine. Such permissive should be made normal / met, before we should go for steam rolling.
2. Jacking oil pump can only be started, if the the lube oil header pressure is adequate.
3. Turning gear motor can be run, if JOP is in service, & if there is proper engagement of turning gear, then the associated limit switch of “turning gear engagement” will send the requisite signal/ permissive.

4. If drum level is very high, it will trip the turbine, as otherwise It will lead to carry over of water droplets.
5. High axial shift may trip the machine. In 110MW BHEL unit, turbine will trips when axial shift would be $\pm(0.65\text{mm})$.
6. Low lube oil pessure will trip the turbine.
7. When a turbine will attain a speed which is more than operating speed, the machine may get a trip impulse for safe operation of the set. In 110MW unit, as a third protection, machine will trip because of high primary oil pressure. Normally it should be 2.64 kg per sq. Cm. at 3000rpm. But the machine will trip when primary oil pressure would be 3.05 kg per sq cm.
8. In Siemens machine, no provision is made to trip a turbine because of high vibration. Such protection is absent in 210MW unit. Naturally, in emergency the turbine may be tripped manually in such cases.
9. When condenser vacuum will drop to 540mm Hg. Turbine will trip.
10. When exhaust hood temperature will shoot, requisite amount of “spray” will be required to tackle the situation. Such arrangement is provided in Siemens machines. No tripping arrangements is provided, as such. High hood temperature may cause drop of condenser vacuum & vice versa and may lead to high differential expansion of turbine, which need to be monitored seriously.

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Nitesh Garg, Rotary Equipment Engineer. More then 8 years of experience
Answered May 7, 2016



Thanks for A2A. Steam turbine is a very important asset of any plant. So for ensuring the safety of system there are lot of interlocks given like.

1. Trip on low lube oil pressure
2. Trip on high lube oil temperature
3. Trip on high axial shift
4. Trip of high radial vibration
5. Trip on overspeed.
6. Trip on high exhaust pressure
7. Trip on high bearing temperature.

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